

IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of March 4, 2013

Regular Board Members Present

A. Abu-Hawash
R. Younie
J. Berger
V. Dumdei
R. Knoche

S. Okerlund
D. Schnoebelen
E. Steffensmeier
W. Weiss

Alternate Board Members Present

W. Klaiber for T. Wipf
P. Mouw for P. Assman

M. Parizek for R. Fangmann

Members with No Representation

R. Kieffer
J. D. King
K. Mayberry

Secretary - M. Dunn

Visitors

Vanessa Goetz
Lori Pflughaupt
Linda Narigon
Nicole Fox
John Dostart
Donna Buchwald
Charlie Purcell
Ken Dunker
Mike Nop
Leighton Christensen
R. Chris Williams
Justin Dahlberg
David Lee
Eric Fitzsimmons
Steven Schrock

Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa DOT Library
Iowa State University/InTrans
Iowa State University/InTrans
University of Iowa
University of Kansas
University of Kansas
City of Ames

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Monday, March 4, 2013. The meeting was called to order at 9:00 a.m. by Chairperson Ahmad Abu-Hawash with an initial number of 8 voting members/alternates at the table.

Agenda

Changes were made to the Agenda.

- ✓ Removed item #7: “Field Implementation Guide for TR-616, “Timber Abutment Piling and Back Wall Rehab and Repair”, Bob Sperry, ISU/In Trans, (\$4,518) (15 min).

This project will be conducted under the LTAP program and will not require additional funding.

Minutes

Motion to approve Minutes from the January 12, 2013 meeting

1st by W. Weiss. 2nd by V. Dumdei.

Motion carried with 8 Aye, 0 Nay, 0 Abstaining.

*****3 members joined the table. Total voting members = 11.**

FINAL REPORT *TR-608, Financial needs of Iowa’s County Roads*, Steve DeVries, ICEA Service Bureau, (\$154,316) (15 min)

BACKGROUND

The TR-608 project arose from issues confronting Iowa’s secondary road departments during the late 2000’s. County engineers, struggling with stagnating revenues and escalating costs, wanted to develop a more accurate statewide assessment of how much money should be spent on county road and bridge upkeep – and a means for communicating this information to the public and political leaders. At the same time, rapid changes in agriculture, (fewer farmers, bigger operations and larger equipment), created concerns about whether or not the system would be able to hold up under future road-user demands – igniting a desire to be better able to predict the eventual outcome of current trends.

The Iowa Highway Research Board identified these concerns as worthy of further research and published a Request for Proposals in April 2009. The Iowa County Engineers Service Bureau responded with a proposal to build, and then permanently maintain, a system to a) annually reassess current needs, b) enable projection of current trends to see how the future may turn out and c) provide means for translating the results into visual formats for communicating findings to the general public. The proposal was accepted and a contract was executed in July 2009. Work started in the fall of 2009 and consisted of five primary tasks:

- ✓ Part 1 – Method for determination of current need levels
- ✓ Part 2 – Derivation of key relationships for forward projections
- ✓ Part 3 – Creation of Trend Projection Engine to estimate future circumstances and needs
- ✓ Part 4 – Future need data extraction, comparison and graphing
- ✓ Part 5 – Pre-defined public information formats

OBJECTIVES

The objective of this project was to create a means for determining a baseline need for secondary roads that can be used for public awareness efforts, legislation advocacy, general information and long term trend analysis. It needed to reflect each county’s unique characteristics, be based on real, reported cost figures, be transparent, and as automated as possible.

DISCUSSION

Q: Have we seen any of this data used in this conversation regarding road use tax.

A: The 2010-2011 data is currently being used.

Implementation discussion:

- ✓ There is a need for counties to upgrade standardize and modernize data collection to provide better data and to maintain current data for future use
- ✓ Steve plans to attend the Iowa DOT steering committee on Asset Management to present this work
- ✓ Automated distress measurement is meaningless for gravel roads. The drivability of the gravel roads network should be studied over time to determine if the system performance is increasing or decreasing
- ✓ The ICEA Service Bureau will lead the implementation efforts for this work

Motion to Approve by W. Weiss. 2nd by E. Steffensmeier.

Motion carried with 11 Aye, 0 Nay, 0 Abstaining.

*****1 member left table. Total voting members = 10.**

PROPOSAL “Evaluation of Low-Cost Signalized Intersection Red Light Running Countermeasures in Medium to Large Communities in Iowa”, Steve Schrock, University of Kansas, (\$70,000) (15 min)

BACKGROUND

- Red light running continues to be a serious safety concern at signalized intersections in the United States
- The FHWA reports (2011) that 676 fatalities in 2009 were due to red light running which represents 10 percent of all intersection crashes and 2 percent of all roadway fatalities
- Many options are available to communities ranging from improved signage, improved signal timing, public campaigns, and automated enforcement
- Where are the gaps in red light running research
 - Low cost countermeasures that help law enforcement and are non-invasive to drivers
 - Potential significant economics savings and safety increase
 - Hallmark et al. (2011) created a toolbox that presents possible countermeasures
 - Beneficial, however Inconclusive or 20+ year old research that may not be applicable to Iowa communities
- What are we proposing to evaluate in Iowa
 - Intersection confirmation light system
 - Medium and large communities where a camera system may not be economically feasible

OBJECTIVE

- Task 1: Literature Search

- Task 2: Work with the Iowa DOT / public works departments / law enforcement / city and county prosecutors in interested communities
- Task 3: Perform RLR violation before-study
- Task 4: Install confirmation light system at a minimum of 2 intersections
- Task 5: Perform one month RLR violation after-study
- Task 6: Perform three month RLR violation after-study
- Task 7: Final report to the Iowa DOT, tech transfer summary, training

DISCUSSION

Q: Concerns with drivers using the tattletale light to jump the green light.

A: Motorist already timing the light anticipating their green light.

Q: Collaboration between universities? ISU and University of Kansas?

A: University of Kansas would be willing to partner with ISU on this project. The board has decided that the scope of the project does not allow for partnership at this time.

Q: Is there a time frame on this project?

A: University of Kansas will try to collect the data in one season.

Motion to Approve by V. Dumdei. 2nd by J. Berger.

Motion carried with 8 Aye, 1 Nay, 1 Abstaining.

*****1 member joined the table. Total voting members = 11.**

PROPOSAL “Development of Quality Standards for Inclusion of High Recycled Asphalt Pavement Content in Asphalt Mixtures - Phase 2”, David Lee, University of Iowa, (\$150,000) (15 min)

RESULTS FROM PHASE 1 STUDY

The main objective of the phase 1 study was to examine the effects that different methods of RAP stockpile fractionation would have on the volumetric mix design properties for high-RAP content surface mixes, with the goal of meeting all specified criteria of Iowa DOT. Different fractionation methods were designed to separate the stockpile at a specified sieve size to control the amount of fine RAP materials which contain higher amounts of fine aggregates and dust contents. A total of thirty-six mix designs were performed using RAP materials from four different stockpiles and the two fractionated methods were used with high-RAP contents up to 50% by virgin binder replacement. By using a fractionation method discarding the minus No. 16 RAP materials from the I-80 RAP stockpile, the mixtures with up to 50% RAP materials were successfully designed while meeting all Iowa DOT's 300K ESAL ½" HMA criteria (except VMA for 50% RAP).

OBJECTIVES

The objective of this phase 2 study is to 1) build a test section utilizing HMA mix designs with up to 50% RAP materials, 2) evaluate the moisture sensitivity of High-RAP mixtures, 3) characterize the low-temperature fracture behavior of High-RAP mixtures, 4) monitor the condition of the field test section in one year after the construction and 5) develop a design guide for High-RAP mixtures including fractionation process and construction quality control. Both laboratory and

field mixtures will be examined, which would help answer the question that how much blending occurs between the binder in RAP and virgin binder.

BENEFITS

A test section with varying RAP contents will be monitored for the duration of the project. The results of the research will be presented as modified asphalt mix design with High-RAP contents. Laboratory tests and field performance of asphalt mixtures with High-RAP contents will help pavement engineers design asphalt mixtures with optimum RAP contents and increase the use of RAP materials while enhancing the long-term performance of pavements in Iowa.

DISCUSSION

The TAC endorses phase 2.

Motion to Approve by J. Berger. 2nd by R. Knoche.
Motion carried with 10 Aye, 0 Nay, 1 Abstaining.

Second Round RFP Review and Discussion FY 12-13

IHRB-12-06, Development of Asphalt Dynamic Modulus Master Curve Using Falling Weight Deflectometer (FWD) Measurements, Halil Ceylan, ISU/InTrans, (\$49,956)

BACKGROUND

State agencies, faced with the challenge of implementing the MEPDG/DARWin ME, are looking to field testing as a possibility for obtaining values for use in new design. The laboratory testing requirements are extensive, and the idea of obtaining default regional properties for specific materials and structures in the field is attractive.

In the MEPDG/ DARWin ME flexible pavement rehabilitation analysis (NCHRP 2004, AASHTO 2011), the pre-overlay damaged master curve of the existing AC layer is determined by first calculating an “undamaged” modulus and then adjusting this modulus for damage using the pre-overlay condition. The undamaged AC master curve is derived from its aggregate gradation and laboratory tested asphalt binder properties/asphalt binder grade using the Witczak’s dynamic modulus predictive equation. Both aggregate gradation and asphalt binder properties/ asphalt binder grade may be obtained from construction records or testing of field cored samples. To characterize the damage in the existing pavement at the time of overlay, MEPDG/ DARWin ME allows the input of NDT back-calculated moduli with frequency and temperature under rehabilitation input level 1 option.

OBJECTIVES

The objective of this study is to develop the asphalt dynamic modulus master curve directly from time histories of routinely collected FWD test data for use in MEPDG/DARWin M-E flexible pavement analysis and rehabilitation design.

Motion to Approve by J. Berger. 2nd by V. Dumdei.

Motion carried with 10 Aye, 0 Nay, 1 Abstaining.

IHRB-12-08, Investigation of Negative Moment Reinforcing in Bridge Decks, Brent Phares, ISU/InTrans, (\$99,970)

BACKGROUND

Current OBS policy regarding the termination of “additional” reinforcing steel in the negative moment regions (i.e., over piers) of prestressed concrete girder bridges appears to be significantly based upon judgment, previous performance, and existing practice. However, a brief survey of other State DOT design guides reveals that policies related to negative moment steel termination vary. For example, Kansas DOT “...considers the bars [to be] anchored by extending the bar pattern to the $\frac{1}{4}$ point plus development length before beginning to stagger the cut-off bar pattern.” Kansas DOT further states that “At least one-third of the total tension reinforcement provided for negative moment at a support shall have an embedment length beyond the point of inflection not less than: (1) effective depth of the member, (2) 12.0 times the nominal diameter of the bar, and (3) 0.0625 times the clear span.” It appears that there is disagreement as to how to best provide for long-lived, crack-free negative moment regions in multi-span, prestressed concrete girder bridges. Further, work conducted by the Federal Highway Administration (FHWA) showed, among other items, that it is possible to have secondary positive moments that counteract negative moments over piers. This possibility may explain why the Iowa DOT has not experienced deck cracking. Further examination of this phenomenon is needed.

OBJECTIVES

- ✓ Investigate OBS policy concerning the amount of negative moment reinforcing required, over piers, to provide continuity in a bridge deck. Specifically, determine if the office policy regarding the amount of negative moment reinforcing steel over the piers is conservative.
- ✓ Investigate the OBS policy regarding terminating negative moment steel at the eighth points of bridge spans.
- ✓ Investigate the impact of terminating the negative moment reinforcing steel at one cross section versus staggering the termination points.
- ✓ Investigate the contribution of secondary moments to bridge performance in negative moment regions.

Motion to Approve by R. Knoche. 2nd by D. Schnoebelen.

Motion carried with 10 Aye, 0 Nay, 1 Abstaining.

IHRB-12-09, Evaluate the Need for Longitudinal Median Joints in Bridge Decks on Dual Structures, Brent Phares, ISU/InTrans, (\$119,857)

BACKGROUND

Most state DOTs know that damaged and leaking bridge deck joints can be a remarkable problem. It is a high priority for many state DOTs to reduce/eliminate deck joints whenever possible, although joints are sometimes unavoidable (Purvis, R., 2003). Literature indicates that DOTs usually determine the maximum allowable deck width not requiring longitudinal joints based upon previous performance of similar bridges.

Unfortunately, extensive analytical and experimental investigations to determine the maximum width of continuous deck without longitudinal joint are lacking in the literature. Of note is that elimination of both the longitudinal joint and the transverse joint require proper dealing to accommodate concrete shrinkage, thermal variation, and creep. Therefore, a review of investigations on jointless bridges without transverse joints may be of benefit to this research. Fortunately, research results for jointless bridges are widely found in the literature. In the following paragraph, research results related to factors affecting the performance of jointless bridges, modification of design for improving their performance, and the derivation of their maximum lengths are discussed.

OBJECTIVES

The main objective of this research is to determine the maximum width of a continuous deck that can be used without overstress. To achieve this objective, analytical techniques including finite element analysis (FEA) will be used to investigate the true behavior of decks with various widths under typical loadings due to temperature change, concrete shrinkage, and live loads. Experimental testing will be conducted in order to provide validation of the analytical models. Based on the outcome of the analytical and experimental investigations, the maximum continuous deck width will be recommended for different types of bridges and guidelines will be developed for the usage of longitudinal deck joints on dual structures.

Motion to Approve by W. Weiss. 2nd by E. Steffensmeier.

Motion carried with 10 Aye, 0 Nay, 1 Abstaining.

NEW BUSINESS

- ✓ County Focus Group meeting was held February 28, 2013. 32 attended
- ✓ Call for Research topics coming out soon. Using the web this time for topic submittal.

ADJOURN

Motion to Adjourn by J. Berger. 2nd by V. Dumdei.

Motion carried with 11 aye, 0 nay, 0 abstaining.

The next meeting of the Iowa Highway Research Board will be held Friday, April 26, 2013, in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin promptly at 9 a.m.



Mark J. Dunn, IHRB Secretary